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(71) Applicant: **Boston Scientific Scimed, Inc.**  
Maple Grove, MN 55311 (US)

(72) Inventors:  
• **YEE, Catherine, Shimin**  
Randolph, MA 02368 (US)

- **RYAN, Shawn**  
Littleton, MA 01568 (US)
- **MAY, Norman**  
Valrico, FL 33594 (US)
- **SUON, Naroun**  
Lawrence, MA 01843 (US)

(74) Representative: **Vossius & Partner**  
Patentanwälte Rechtsanwälte mbB  
Siebertstraße 3  
81675 München (DE)

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## (54) ACTUATION HANDLE FOR ACCESSORY DEVICES

(57) The present invention relates to an actuation device comprising: a device body that comprises a curved slot and a first fixation mechanism configured to affix a proximal end of a first elongate member of an accessory device to the device body, a fastener configured to attach the device body to an endoscope, and an actuator comprising a lever, a projection, and a second fixation mechanism configured to affix a proximal end of a second elongate member of the accessory device to the actuator, wherein the lever is configured to move the actuator around a pivot, such that movement of the lever in a first direction results in retraction of the second elongate member relative to the first elongate member and such that movement of the lever in a second direction opposite the first direction results in advancement of the second elongate member relative to the first elongate member, wherein the projection of the actuator is configured to move within the curved slot upon rotation of the actuator about the pivot.

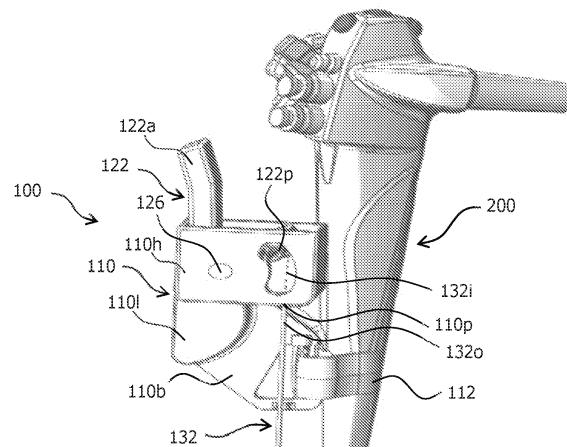


Fig. 1A

## Description

### CROSS REFERENCE TO RELATED APPLICATIONS

**[0001]** This application claims priority to U.S. Provisional Patent Application Serial No. 62/258,107, filed November 20, 2015; which is herein incorporated by reference in its entirety.

### FIELD OF THE INVENTION

**[0002]** The present disclosure generally relates to actuation devices suitable for use in operating accessory devices during an endoscopic procedure.

### BACKGROUND

**[0003]** Currently, operators typically often perform endoscopic procedures with the help of assistants to actuate the accessory devices. Ideally, an operator would be able to operate an endoscope while at the same time actuating an accessory device.

### SUMMARY

**[0004]** In various aspects, the present disclosure pertains to actuation devices suitable for use in operating accessory devices during an endoscopic procedure. The actuation devices comprise: (a) a device body that comprises a first fixation mechanism configured to affix a proximal end of a first elongate member of an accessory device to the device body, (b) an actuator comprising an operable mechanism and a second fixation mechanism configured to affix a proximal end of a second elongate member of an accessory device to the actuator, wherein the operable mechanism is configured to move the second elongate member relative to the first elongate member, and (c) a fastener configured to attach the device body to an endoscope.

**[0005]** In some embodiments, the device body comprises an opening that allows access to a working channel of the endoscope.

**[0006]** In some embodiments, which may be used in conjunction with any of the above aspects and embodiments, the device body may comprise a protrusion that is configured for insertion into a working channel of the endoscope when the device body is attached to the endoscope. In certain of these embodiments, the protrusion may comprise a lumen through which the first and second elongate members of the accessory device can be threaded into the working channel of the endoscope.

**[0007]** In some embodiments, which may be used in conjunction with any of the above aspects and embodiments, the first mechanism may comprise a set screw or clamp and a through hole, the second mechanism may comprise a set screw or clamp and a through hole or a blind hole, or a combination of both.

**[0008]** In some embodiments, which may be used in

conjunction with any of the above aspects and embodiments, the second fixation mechanism may comprise an electrical connector that is configured to electrically connect the second elongate member to an electrical generator.

**[0009]** In some embodiments, which may be used in conjunction with any of the above aspects and embodiments, the fastener may comprise an attachment component that spreads and snaps onto the endoscope.

**[0010]** In some embodiments, which may be used in conjunction with any of the above aspects and embodiments, the device body may be connected to the fastener in a hinged arrangement.

**[0011]** In some embodiments, which may be used in conjunction with any of the above aspects and embodiments, the actuator may be pivotally mounted relative to the device body and the actuator may comprise a lever that can move the actuator around a pivot, such that movement of the lever in a first direction results in retraction of the second elongate member relative to the first elongate member and such that movement of the lever in a second direction opposite the first direction results in advancement of the second elongate member relative to the first elongate member. In certain of these embodiments, (a) the actuator may comprise a projection and the device body may comprise a curved slot within which the projection travels upon rotation of the actuator about the pivot, or (b) the actuator may comprise a first arm that comprises the lever and a second arm that comprises

**[0012]** In some embodiments, which may be used in conjunction with any of the above aspects and embodiments, the actuator can be set to a plurality of fixed positions within the device body. For instance, the actuator and device body may comprise interlocking stepped ridges, or one of the actuator and the device body may comprise a plurality of depressions and the other of the actuator and the device body may comprise a spring-driven ball that engages the depressions, among other possibilities.

**[0013]** In some embodiments, which may be used in conjunction with any of the above aspects and embodiments, the device body may comprise a port that is configured to allow access for a guidewire.

**[0014]** Other aspects of the present disclosure pertain to endoscopic systems that comprise (a) an endoscope having endoscope controls and a working channel, (b) an actuation device in accordance with any of the above aspects and embodiments, attached to the endoscope through the fastener, and (c) an accessory device that comprises first and second elongate members, the first elongate member being attached to the device body through the first fixation mechanism and the second elongate member being attached to the actuator through the

second fixation mechanism. The actuation device may be configured such that, when attached to the endoscope, a single hand of a user can operate both the endoscope controls and operable mechanism of the actuation device.

**[0015]** In some embodiments, which may be used in conjunction with any of the above aspects and embodiments, the first elongate member may be an outer elongate member having a lumen (e.g., in the form of a tube) and the second elongate member may be an inner elongate member (e.g., in the form of a wire or a tube) that is disposed at least partially within the lumen of the outer elongate member.

**[0016]** In some embodiments, which may be used in conjunction with any of the above aspects and embodiments, the accessory device may be fed through the working channel of the endoscope.

**[0017]** In some embodiments, which may be used in conjunction with any of the above aspects and embodiments, the accessory device may be fed alongside the endoscope.

**[0018]** In some embodiments, which may be used in conjunction with any of the above aspects and embodiments, the accessory device may be selected from a knife, a sphincterotome, a snare, an injection device, and forceps.

**[0019]** In some embodiments, which may be used in conjunction with any of the above aspects and embodiments, a cutting member may be attached to a distal end of the second elongate member, such that the cutting member may be exposed upon advancement of the second elongate member relative to the first elongate member, or such that the cutting member may be exposed upon retraction of the second elongate member relative to the first elongate member.

**[0020]** Further aspects of the present disclosure may pertain to kits that comprise (a) an actuation device in accordance with any of the above aspects and embodiments and (b) an accessory device in accordance with any of the above aspects and embodiments.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0021]**

FIGS. 1A and 1B are schematic perspective views showing an endoscope handle, a proximal portion of an accessory device, and an actuation device in accordance with the present disclosure, wherein a lever of the actuation device is placed in two positions for actuation of the accessory device.

FIGS. 2A and 2B are front and back views of actuation device in accordance with the present disclosure.

FIG. 3 is a perspective view of an endoscope handle, a proximal portion of an accessory device and an actuation device, in accordance with the present disclosure.

FIG. 4 is a view of a portion of an endoscope handle, a proximal portion of an accessory device and an actuation device, in accordance with the present disclosure.

FIGS. 5A and 5B are views of a distal portion of a sphincterotome that is operable using an actuation device in accordance with the present disclosure, wherein the sphincterotome is shown in non-deployed and deployed configurations, respectively.

FIGS. 6A and 6B are views of a distal portion of an endoscope and attached cutting knife that is operable using an actuation device in accordance with the present disclosure, wherein the cutting knife is shown in non-deployed and deployed configurations, respectively.

#### DETAILED DESCRIPTION

**[0022]** Various particular aspects and embodiments of the disclosure will now be described. As used herein, the term "distal" refers to the end farthest away from a medical professional when introducing a device into a patient, while the term "proximal" refers to the end closest to the medical professional when introducing a device into a patient.

**[0023]** With reference now to Fig. 1A, an actuation device 100 is shown in a coupled state with an endoscope 200 and an accessory device 132. The actuation device 100 shown comprises a device body 110, which in the specific embodiment shown includes a housing portion 110h, a bracket portion 110b and a linking portion 110l, which links the housing portion 110h to the bracket portion 110b. The device body 110 further comprises a first connection point 110p where a proximal end of a first elongate member of the accessory device 132, specifically, a hollow outer elongate member 132o (e.g., a catheter) in the particular embodiment shown, is fixed to the body 110. Connection is made via a first attachment mechanism. For example, a through-hole may be formed in the housing portion 110h and a fixation member (e.g., a set screw, clamp, etc.) may be used to fix the proximal end of the hollow outer elongate member 132o within the through-hole.

**[0024]** The actuation device 100 further includes an operable mechanism, specifically, an actuator 122 pivotally mounted relative to the housing portion 110h, in the embodiment shown. The actuator 122 shown comprises a lever 122a that can rotate the actuator 122 around a pivot 126 (e.g., via a pivot pin). The actuator 122 also comprises a second connection point 122p where a proximal end of a second elongate member of the accessory device 132, specifically, an inner elongate member 132i in the particular embodiment shown, is attached to the actuator 122. The inner elongate member 132i is slidably disposed within the outer elongate member 132o of the accessory device 132. The inner elongate member 132i may be solid (e.g., in the form of a wire) or hollow (e.g., in the form of a tube). Connection is made

via a second attachment mechanism. For example, a hole (e.g., a blind hole or a through hole) may be formed in the actuator 122 and a fixation member (e.g., a set screw, clamp, etc.) may be used to fix a proximal end of the inner elongate member 132i within the hole. In this way, an operable mechanism may be provided, which is configured to move one elongate member (i.e., an inner elongate member 132i in the embodiment shown) relative to another elongate member (i.e., an outer elongate member 132o in the embodiment shown).

**[0025]** In applications where electrosurgery is required, the actuation device 100 may have an electrically active port so that it can be connected to an electrosurgical generator. In certain of these embodiments, the second attachment mechanism may provide a port for electrical connection to the inner elongate member 132i.

**[0026]** In some embodiments, the actuator 122 may comprise first and second arms, with the first arm corresponding to the lever 122a and the second arm being provided with the second connection point 122p where the proximal end of the inner elongate member 132i of the accessory device 132 is attached to the actuator 122.

**[0027]** In addition to the preceding components, the actuation device 100 may further include a fastener 112 that is configured to attach the device body 110 to the endoscope 200 at a point adjacent to a handle of the endoscope. Examples of fasteners for this purpose include, for instance, straps (e.g., elastic straps, VELCRO hook-and-loop fastener straps, etc.), snap-on clamps, and form fitting grooves, among other possibilities.

**[0028]** With an arrangement such as that shown in FIGS. 1A and 1B, rotation of the actuator 122 around the pivot 126 and relative to the device body 110 results in movement of the inner elongate member 132i (which is fixed to the actuator 122) relative to the outer elongate member 132o (which is fixed to the device body 110). In the particular embodiment shown, pulling the lever 122a toward the endoscope 200 as shown in FIG. 1B causes the inner elongate member 132i to advance distally relative to the outer elongate member 132o, whereas pushing the lever 122a away from endoscope 200 as shown in FIG. 1A causes the inner elongate member 132i to retract proximally relative to the outer elongate member 132o.

**[0029]** As will be appreciated by those of ordinary skill in the art, the distance that the inner elongate member 132i moves in relation to the outer elongate member 132o is determined by the degree (angle) of rotation of the actuator 122 around the pivot 126 and the distance between the second connection point 122p and the pivot 126.

**[0030]** Thus, by affixing the outer elongate member 132o to the housing 110h of the device body 110 and by affixing the inner elongate member 132i that runs within the outer elongate member 132o to the pivoting actuator 122, the rotation of the actuator 122 can actuate the desired effect.

**[0031]** Although pulling the lever 122a in the embodi-

ment shown acts to advance the inner elongate member 132i relative to outer elongate member 132o and pushing the lever 122a retracts the inner elongate member 132i relative to outer elongate member 132o, one of ordinary skill in the art will appreciate that, in other arrangements, such as that shown in FIG. 4, among others, pulling the lever 122a will act to retract the inner elongate member 132i relative to outer elongate member 132o and pushing the lever 122a will act to advance the inner elongate member 132i relative to outer elongate member 132o. As discussed in more detail below, advancement and retraction of this type may be used to actuate a variety of accessory devices 132 during the course of an endoscopic procedure.

**[0032]** In some embodiments, the actuation device 100 will further comprise a spring or another mechanism that is configured to bring the actuator 122 to a default position when the lever 122a is released. For instance, the default position may correspond to an actuator 122 position where the inner elongate member 132i is retracted relative to the outer elongate member 132o. Alternatively, the default position may correspond to an actuator 122 position where the inner elongate member 132i is advanced relative to the outer elongate member 132o, or something in between. In one particular example, the default position may correspond to an actuator 122 position where an implement (knife, needle, etc.) disposed at a distal end of the inner elongate member 132i is retracted within the outer elongate member 132o.

**[0033]** In some embodiments, the actuation device 100 will further comprise a port that is configured to allow access for a guidewire. In applications where a guidewire is used in conjunction with the accessory device 132, a separate guidewire port may be provided in the actuation device 100 to allow access for the guidewire.

**[0034]** In some embodiments, the actuator 122 (and thus the position of the inner elongate member 132i relative to the outer elongate member 132o) may be set to any of a plurality of different positions. For example, the actuator 122 may be held at a desired position relative to the housing portion 110h via a releasable locking mechanism, for instance, by providing the actuator 122 and the housing portion 110h with interlocking stepped ridges (e.g., analogous to the complementary ridges of a hemostat). Upon release, the actuator 122 may, in some embodiments, return to a default position via a spring mechanism as discussed above. As another example, the lever actuator 122 may comprise a plurality of depressions and the housing portion 110h may comprise a spring-driven ball (e.g., in the form of a ball nose spring plunger, etc.) that engages the depressions, or conversely, the housing portion 110h may comprise a plurality of depressions while the actuator 122 may comprise a spring-driven ball that engages the depressions.

**[0035]** Further details of an actuation device 100 like that shown in FIGS. 1A and 1B will now be described in conjunction with FIGS. 2A and 2B. Shown are the components of the device body 110, specifically, the housing

portion 110h, bracket portion 110b and linking portion 1101, which are secured to one another and which could readily be formed as a single piece, if desired. As seen from FIGS. 2A, the fastener 112 that is configured to attach the device body 110 to the endoscope is in the form of a piece that spreads and snaps onto the endoscope body. The fastener 112 is linked to the bracket 110b via a hinge in the embodiment shown, allowing the fastener 112 to hinge around the endoscope body 220. In addition, there is also seen a protrusion 128 that is configured to be inserted into a working channel of the endoscope 200 to which the actuation device 100 is attached. In certain embodiments, an opening will be provided in the actuation device 100, which permits the accessory device 132 access to an endoscope working channel. In the embodiment shown, a lumen extends from a proximal point 127p to a distal point 127d at a distal end of the protrusion 128, through which the accessory device 132 may be threaded. This arrangement may be further appreciated with the assistance of Fig. 3, which shows the actuation device 100 attached to the endoscope body 220 via the fastener 112. The protrusion 128 is not seen as it is inserted into a port of a working channel 210 of the endoscope, and the accessory device 132 is introduced into the working channel 210 by looping the accessory device 132 into a lumen entrance at point 128p. In this way, the accessory device 132 may be looped around from the bottom of the actuation device 100 to the top of the actuation device 100 to enter into the working channel 210, among other possibilities.

**[0036]** As can be seen from Fig. 3, the actuation device 100 allows an endoscopist to control both the endoscope 200 and the accessory device 132 using one hand. This way, the endoscopist may maneuver and deploy the accessory device 132 without help from an assistant. In this regard, the present disclosure solves the inconvenience of the endoscopist having to depend on an assistant to work the accessory device, thereby allowing the endoscopist full control of the endoscope and accessory device. This way the endoscopist can easily switch between using the features of the endoscope (e.g., water introduction, insufflation, suction, left/right movement, up/down movement, endoscope lock, etc.) and operating the accessory device, single-handedly and comfortably. This also leaves the endoscopist's other hand free to continue maneuvering the sheath of the endoscope.

**[0037]** Although the accessory device 132 is routed through the working channel 210 of the endoscope 200 in FIG. 3, in other embodiments, the accessory device 132 may be run alongside the endoscope (e.g., along the length of the endoscope body 220), rather than within a working channel 210 of the endoscope. In these embodiments, the actuation device may be provided with a through-hole or clip for accessory device management. In various embodiments, the accessory device 132 may be longer than the endoscope body 220 to allow the physician to push the accessory device 132 beyond the distal end of the endoscope body and pull it back in as needed.

**[0038]** With reference now to FIG. 2B, one can see the housing portion 110h, bracket portion 110b and linking portion 1101 of the device body 110. Further shown is the first connection point 110p where the proximal end 5 of the hollow outer elongate member 132o is fixed to the body 110. Also shown are portions of the actuator 122 that are pivotally mounted relative to the housing portion 110h, specifically, the lever 122a which is employed to rotate the actuator 122 around the pivot 126 (which in this particular case is in the form of a pivot pin). Also shown is the second connection point 122p where the proximal end 10 of the inner elongate member 132i (in the form of an actuation wire) is attached. In this particular embodiment, the actuation wire is attached via a 2-in-1 active cord connector 123 which is screwed into a D-block 127 until the actuation wire is fixed in place. Thus, in this embodiment, the connector acts as both a mechanical connector and an electrical connector (e.g., a monopolar electrical connector). Moreover, the connector 15 also forms a protrusion which travels within a slot 119 that is formed in housing 110h. The slot 119 limits the travel of the protrusion and thus the rotation of the actuator within the housing 110h.

**[0039]** Accessory devices which may be actuated by 25 the actuation device of the present disclosure include those that are used in conjunction various procedures including, for example, endoscopic mucosal resection (EMR), endoscopic submucosal dissection (ESD), polypectomy, colonoscopy, transurethral surgery, respiratory surgery, and laparoscopic surgery, among others.

**[0040]** One specific example of an accessory device 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400 405 410 415 420 425 430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525 530 535 540 545 550 555 560 565 570 575 580 585 590 595 600 605 610 615 620 625 630 635 640 645 650 655 660 665 670 675 680 685 690 695 700 705 710 715 720 725 730 735 740 745 750 755 760 765 770 775 780 785 790 795 800 805 810 815 820 825 830 835 840 845 850 855 860 865 870 875 880 885 890 895 900 905 910 915 920 925 930 935 940 945 950 955 960 965 970 975 980 985 990 995 1000 1005 1010 1015 1020 1025 1030 1035 1040 1045 1050 1055 1060 1065 1070 1075 1080 1085 1090 1095 1100 1105 1110 1115 1120 1125 1130 1135 1140 1145 1150 1155 1160 1165 1170 1175 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7180 7185 7190 7195 7200 7205 7210 7215 7220 7225 7230 7235 7240 7245 7250 7255 7260 7265 7270 7275 7280 7285 7290 7295 7300 7305 7310 7315 7320 7325 7330 7335 7340 7345 7350 7355 7360 7365 7370 7375 7380 7385 7390 7395 7400 7405 7410 7415 7420 7425 7430 7435 7440 7445 7450 7455 7460 7465 7470 7475 7480 7485 7490 7495 7500 7505 7510 7515 7520 7525 7530 7535 7540 7545 7550 7555 7560 7565 7570 7575 7580 7585 7590 7595 7600 7605 7610 7615 7620 7625 7630 7635 7640 7645 7650 7655 7660 7665 7670 7675 7680 7685 7690 7695 7700 7705 7710 7715 7720 7725 7730 7735 7740 7745 7750 7755 7760 7765 7770 7775 7780 7785 7790 7795 7800 7805 7810 7815 7820 7825 7830 7835 7840 7845 7850 7855 7860 7865 7870 7875 7880 7885 7890 7895 7900 7905 7910 7915 7920 7925 7930 7935 7940 7945 7950 7955 7960 7965 7970 7975 7980 7985 7990 7995 8000 8005 8010 8015 8020 8025 8030 8035 8040 8045 8050 8055 8060 8065 8070 8075 8080 8085 8090 8095 8100 8105 8110 8115 8120 8125 8130 8135 8140 8145 8150 8155 8160 8165 8170 8175 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9180 9185 9190 9195 9200 9205 9210 9215 9220 9225 9230 9235 9240 9245 9250 9255 9260 9265 9270 9275 9280 9285 9290 9295 9300 9305 9310 9315 9320 9325 9330 9335 9340 9345 9350 9355 9360 9365 9370 9375 9380 9385 9390 9395 9400 9405 9410 9415 9420 9425 9430 9435 9440 9445 9450 9455 9460 9465 9470 9475 9480 9485 9490 9495 9500 9505 9510 9515 9520 9525 9530 9535 9540 9545 9550 9555 9560 9565 9570 9575 9580 9585 9590 9595 9600 9605 9610 9615 9620 9625 9630 9635 9640 9645 9650 9655 9660 9665 9670 9675 9680 9685 9690 9695 9700 9705 9710 9715 9720 9725 9730 9735 9740 9745 9750 9755 9760 9765 9770 9775 9780 9785 9790 9795 9800 9805 9810 9815 9820 9825 9830 9835 9840 9845 985

default position for the sphincterotome 132 like that shown in FIG. 5A. Such an accessory device 132 may be run alongside an endoscope or be routed through a working channel of the endoscope.

**[0042]** In the preceding example of a sphincterotome, the accessory device 132 is deployed by retracting the inner elongate member 132i relative to the outer elongate member 132o. In other instances, the accessory device 132 is deployed by advancing the inner elongate member 132i relative to the outer elongate member 132o. In this regard, and turning to FIGS. 6A-6B, another example of an accessory device 132 in the form of a cutting knife is shown. The accessory device 132 includes an inner elongate member 132i (i.e., a wire) and an outer elongate member 132o (i.e., a catheter) which are connected at a proximal end (not shown) to an actuation device 100 as previously described. The distal end of the accessory device 132 may be reversibly attached to a distal end 200d of an endoscope via a loop 135 as shown, with the accessory device 132 running outside the endoscope 200, rather than being routed through a working channel of the endoscope, although an analogous accessory device 132 could be routed through the working channel if desired.

**[0043]** When the lever 122a of the actuation device 100 is positioned such that the inner elongate member 132i is proximally retracted relative to the outer elongate member 132o, the accessory device 132 takes on an orientation like that shown in FIG. 6A. On the other hand, when the lever 122a of the actuation device 100 is positioned such that the inner elongate member 132i is distally advanced relative to the outer elongate member 132o, a cutting knife 136 disposed at a distal end of the inner elongate member 132i extends from the distal end 132od of the outer elongate member 132o as shown in FIG. 6B. Electrical current may be passed through the exposed cutting knife 136 during the cutting process, for example, by establishing a monopolar connection to an electrosurgical generator as previously described.

**[0044]** If desired, the actuation device may be configured such that the default position for the lever 122a is one where the inner elongate member 132i is retracted relative to the outer elongate member 132o, resulting in a default position for the accessory device 132 like that shown in FIG. 6A. The act of engaging the lever 122a (e.g., squeezing the lever 122a or pushing the lever 122a, depending on the configuration) will deploy the cutting knife 136 out of the distal end 132od of the outer elongate member 132o, thereby exposing the cutting knife 136 for use. Releasing the lever 122a places the cutting knife 136 into its default retracted position for safety.

**[0045]** In other embodiments, the actuation device 100 may be coupled to an accessory device 132 that comprises an articulating hook or grasper at the distal end. The lever 122a may be used to articulate the distal tool to one side, analogous to the above-described sphincterotome, with the inner elongate member 132i being provided in an off-center position (e.g., in an off-center lu-

men). In other embodiments, the actuation device 100 may be used to deploy a clip, may be used to deploy a band during EMR, or may be used to deploy a stent. In yet other embodiments, the actuation device 100 may be used to inject a solution, for example, for contrast or for elevation of a lesion, among many other possible applications. In still other embodiments, the actuation device 100 may be used to actuate a snare (including a hot snare) or to actuate hot or cold biopsy forceps. In still other embodiments, the actuation device 100 may be used to actuate a catheter (e.g., Alair™ Bronchial Thermoplasty system, Boston Scientific Corporation, Marlborough MA.), a medical laser probe (e.g., thulium laser system) or mechanical scissors.

**[0046]** In some embodiments, the actuation device may be manufactured to be universal, so that different accessory devices may be easily attached to it. That way when the physician is switching tools, the handle can be left in place while the accessory tool is swapped.

**[0047]** While the devices, assemblies and methods of this disclosure have been described in terms of preferred embodiments, it may be apparent to those of skill in the art that variations can be applied without departing from the concept, spirit and scope of the disclosure. All such similar substitutes and modifications apparent to those skilled in the art are deemed to be within the spirit, scope and concept of the disclosure as defined by the appended claims.

**[0048]** The following aspects are preferred embodiments of the invention.

1. An actuation device comprising: (a) a device body that comprises a first fixation mechanism configured to affix a proximal end of a first elongate member of an accessory device to the device body, (b) an actuator comprising an operable mechanism and a second fixation mechanism configured to affix a proximal end of a second elongate member of the accessory device to the actuator, wherein the operable mechanism is configured to move the second elongate member relative to the first elongate member, and (c) a fastener configured to attach the device body to an endoscope.

2. The actuation device of aspect 1, wherein the device body comprises a protrusion that is configured for insertion into a working channel of the endoscope when the device body is attached to the endoscope.

3. The actuation device of any of aspects 1-2, wherein the fastener comprises an attachment component that spreads and snaps onto the endoscope.

4. The actuation device of any of aspects 1-3, wherein the device body is connected to the fastener in a hinged arrangement.

5. The actuation device of any of aspects 1-4, where-

in the actuator is pivotally mounted relative to the device body, wherein the actuator comprises a lever that can move the actuator around a pivot, wherein movement of the lever in a first direction results in retraction of the second elongate member relative to the first elongate member and wherein movement of the lever in a second direction opposite the first direction results in advancement of the second elongate member relative to the first elongate member.

6. The actuation device of any of aspects 1-5, wherein the actuator can be set to a plurality of fixed positions within the device body.

7. The actuation device of any of aspects 1-6, wherein the second fixation mechanism comprises an electrical connector that is configured to electrically connect the second elongate member to an electrical generator.

8. The actuation device of any of aspects 1-7, wherein the device body comprises a port that is configured to allow access for a guidewire.

9. An endoscopic system comprising (a) an endoscope having endoscope controls and a working channel, (b) an actuation device in accordance with any of claims 1-8 attached to the endoscope through the fastener, and (c) an accessory device comprising the first elongate member and the second elongate member, the first elongate member being attached to the device body through the first fixation mechanism and the second elongate member being attached to the actuator through the second fixation mechanism, wherein the actuation device is configured such that, when attached to the endoscope, a single hand of a user can operate both the endoscope controls and the operable mechanism of the actuation device.

10. The endoscopic system of aspect 9, wherein the first elongate member is an outer elongate member having a lumen and the second elongate member is an inner elongate member that is disposed at least partially within the lumen of the outer elongate member.

11. The endoscopic system of any of aspects 9-10, wherein the accessory device is fed through the working channel of the endoscope.

12. The endoscopic system of any of aspects 9-10, wherein the accessory device is fed alongside the endoscope.

13. The endoscopic system of any of aspects 9-12, wherein the accessory device is selected from a knife, a sphincterotome, a snare, an injection device,

and forceps.

14. The endoscopic system of any of aspects 9-12, wherein a cutting member is attached to a distal end of the second elongate member, and wherein the cutting member is exposed upon advancement of the second elongate member relative to the first elongate member or wherein the cutting member is exposed upon retraction of the second elongate member relative to the first elongate member.

15. A kit comprising the actuation device of any of aspects 1-8 and an accessory device comprising said first elongate member and said second elongate member.

## Claims

20 1. An actuation device comprising:

a device body that comprises a curved slot and a first fixation mechanism configured to affix a proximal end of a first elongate member of an accessory device to the device body, a fastener configured to attach the device body to an endoscope, and an actuator comprising a lever, a projection, and a second fixation mechanism configured to affix a proximal end of a second elongate member of the accessory device to the actuator, wherein the lever is configured to move the actuator around a pivot, such that movement of the lever in a first direction results in retraction of the second elongate member relative to the first elongate member and such that movement of the lever in a second direction opposite the first direction results in advancement of the second elongate member relative to the first elongate member, wherein the projection of the actuator is configured to move within the curved slot upon rotation of the actuator about the pivot.

45 2. The actuation device of claim 1, wherein the device body comprises an opening that allows access to a working channel of an endoscope, and/or wherein the device body comprises a port that is configured to allow access for a guidewire.

3. The actuation device of claim 2, wherein the device body comprises a protrusion that is configured for insertion into the working channel of the endoscope when the device body is attached to the endoscope.

55 4. The actuation device of claim 3, wherein the protrusion comprises a lumen and wherein the first and second elongate members of the accessory device

can be threaded through the lumen and into the working channel of the endoscope.

5. The actuation device of any of claims 1-4, wherein the fastener has an attachment component that is configured for spreading and snapping onto an endoscope; and/or wherein the device body is connected to the fastener in a hinged arrangement.

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6. The actuation device of any of claims 1-5, wherein the curved slot limits the travel of the projection and thus the rotation of the actuator within the device body.

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7. The actuation device of any of claims 1-6, wherein the actuator can be set to a plurality of fixed positions within the device body.

8. The actuation device of any of claims 1-7, wherein the first fixation mechanism comprises a set screw or clamp and a through hole, wherein the second fixation mechanism comprises a set screw or clamp and a through hole or a blind hole, or both.

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9. The actuation device of claim of any of claims 1-8, wherein the second fixation mechanism comprises an electrical connector that is configured to electrically connect the second elongate member to an electrical generator.

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10. The actuation device of any of claims 1-9, further comprising a biasing member configured to bring the actuator to a default position when the lever is released.

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11. An endoscopic system comprising:

an endoscope having endoscope controls and a working channel,

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an actuation device in accordance with any of claims 1-10 attached to the endoscope through the fastener, and

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an accessory device comprising the first elongate member and the second elongate member, the first elongate member being attached to the device body through the first fixation mechanism, and the second elongate member being attached to the actuator through the second fixation mechanism;

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optionally wherein the actuation device is configured such that a single hand of a user can operate both the endoscope controls and the lever of the actuation device.

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12. The endoscopic system of claim 11, wherein the first elongate member is an outer member having a lumen, and the second elongate member is an inner member that is disposed at least partially within the lumen of the outer member.

13. The endoscopic system of claim 11 or 12, wherein the endoscopic system is configured such that the accessory device is fed through the working channel of the endoscope; and/or wherein the accessory device is selected from a knife, a sphincterotome, a snare, an injection device, and forceps.

14. The endoscopic system of any of claims 11-13, wherein a cutting member is attached to a distal end of the second elongate member, and wherein the cutting member is exposed upon advancement of the second elongate member relative to the first elongate member, or wherein the cutting member is exposed upon retraction of the second elongate member relative to the first elongate member.

15. A kit comprising the actuation device any of claims 1-10 and the accessory device comprising the first elongate member and the second elongate member.

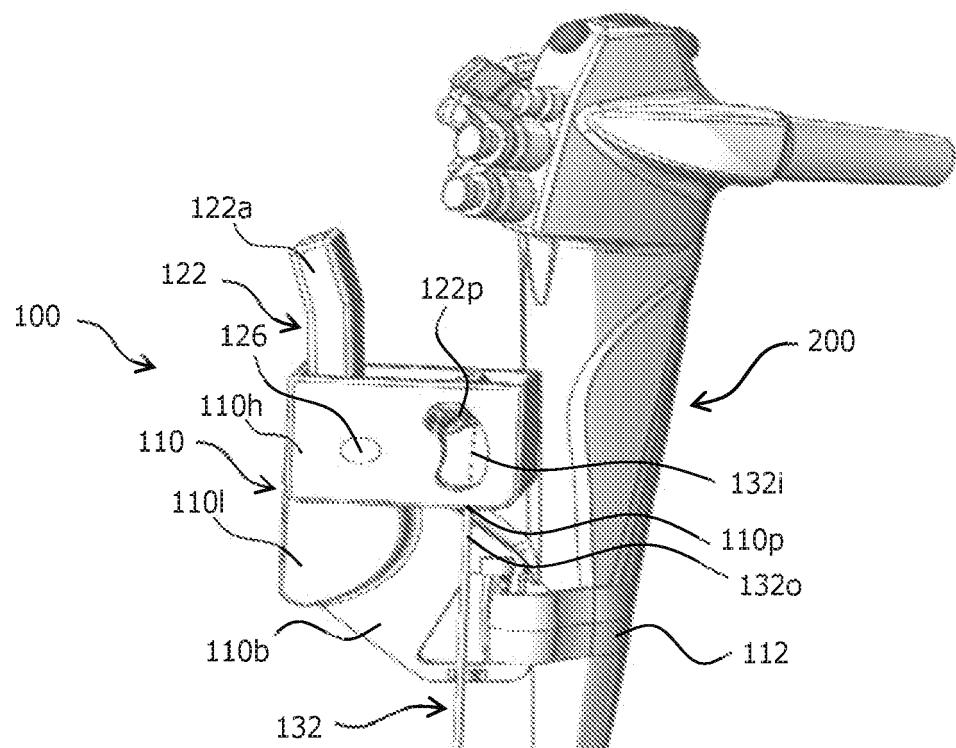


Fig. 1A

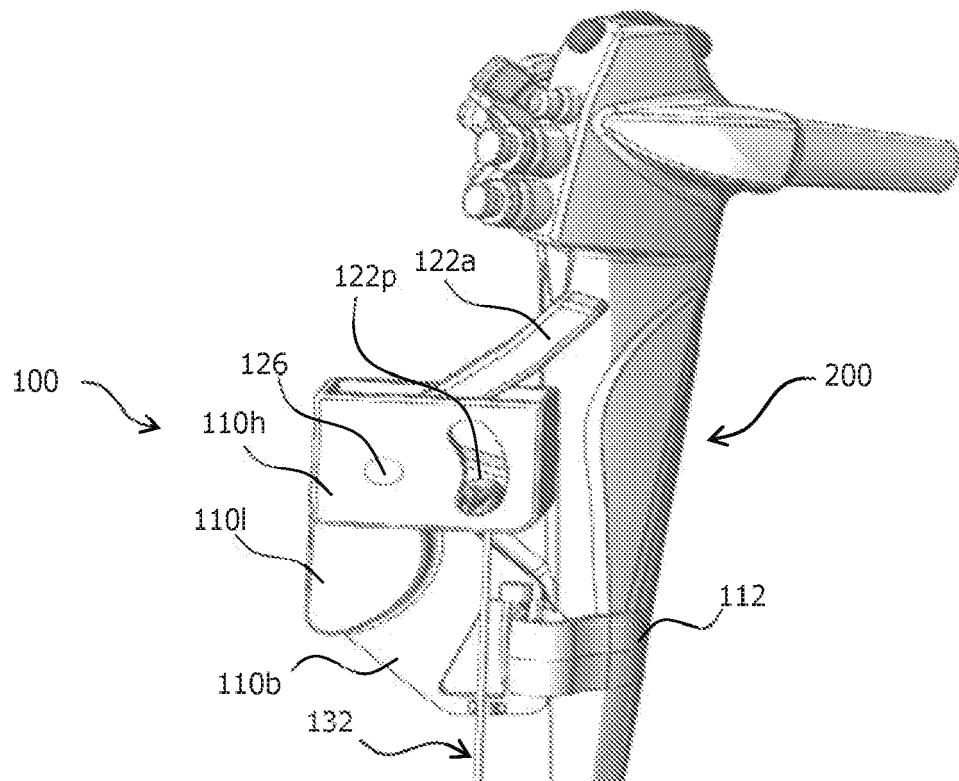


Fig. 1B

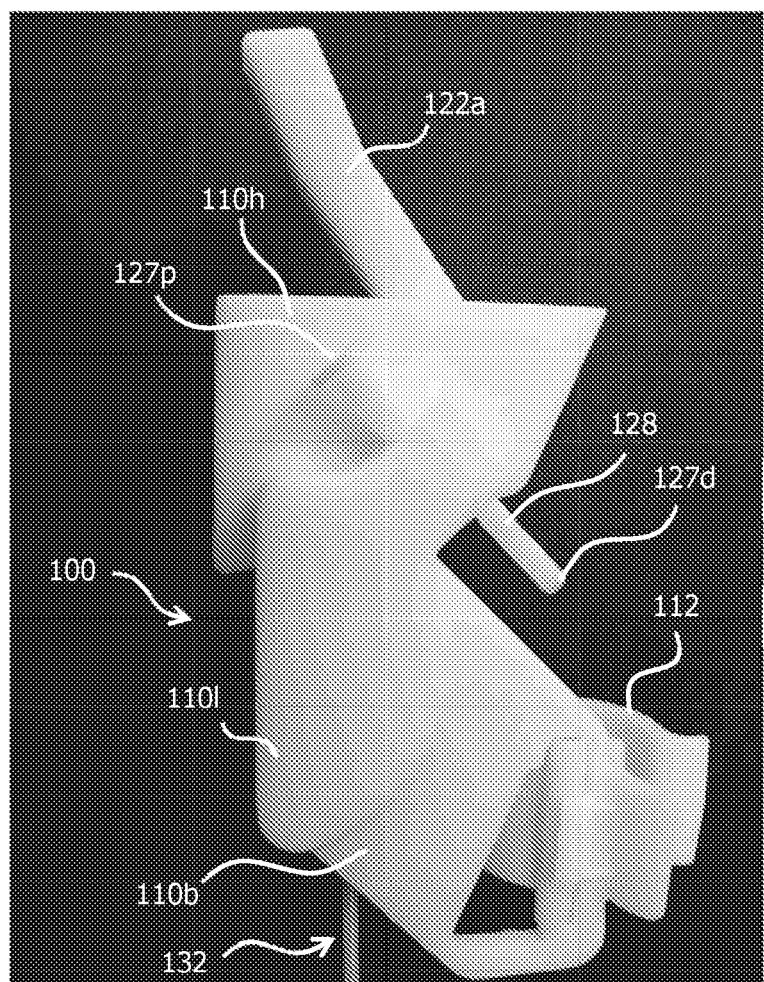


Fig. 2A

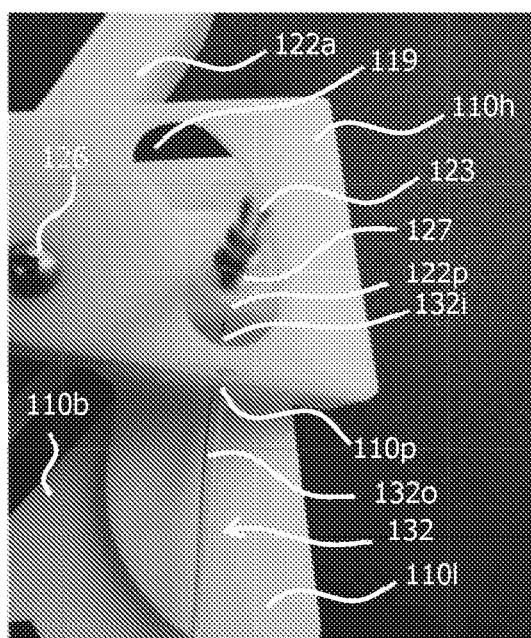


Fig. 2B

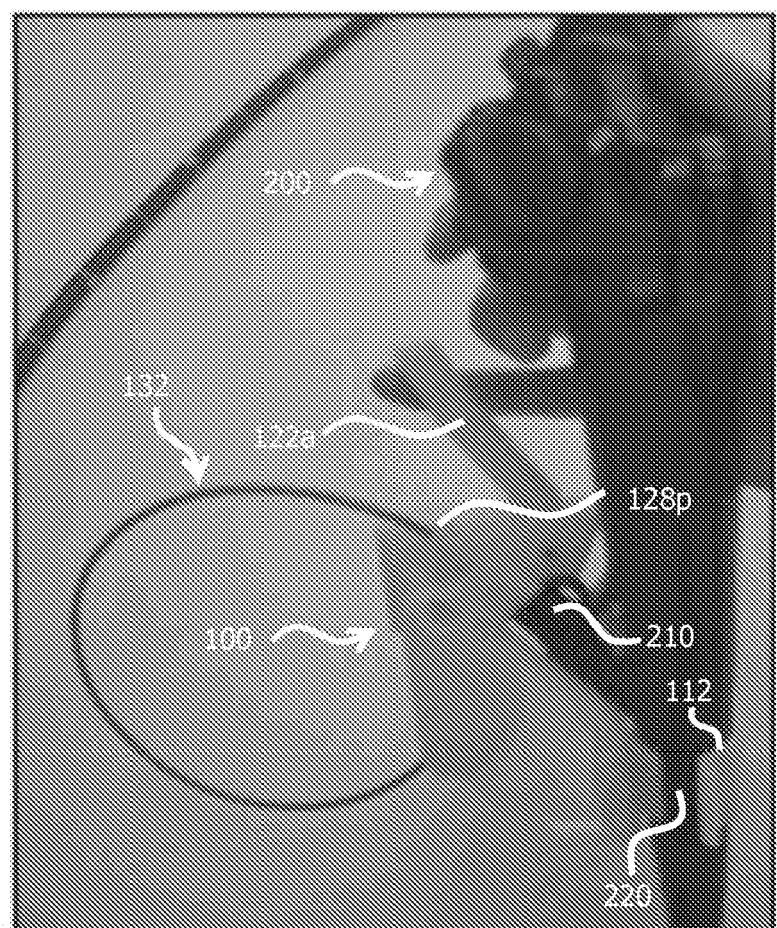


Fig. 3

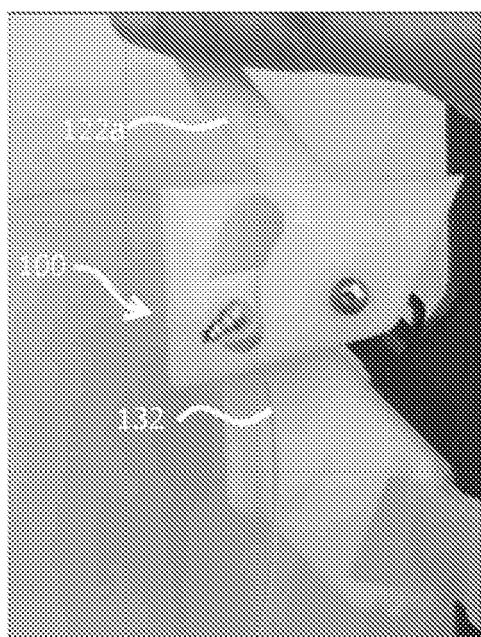


Fig. 4

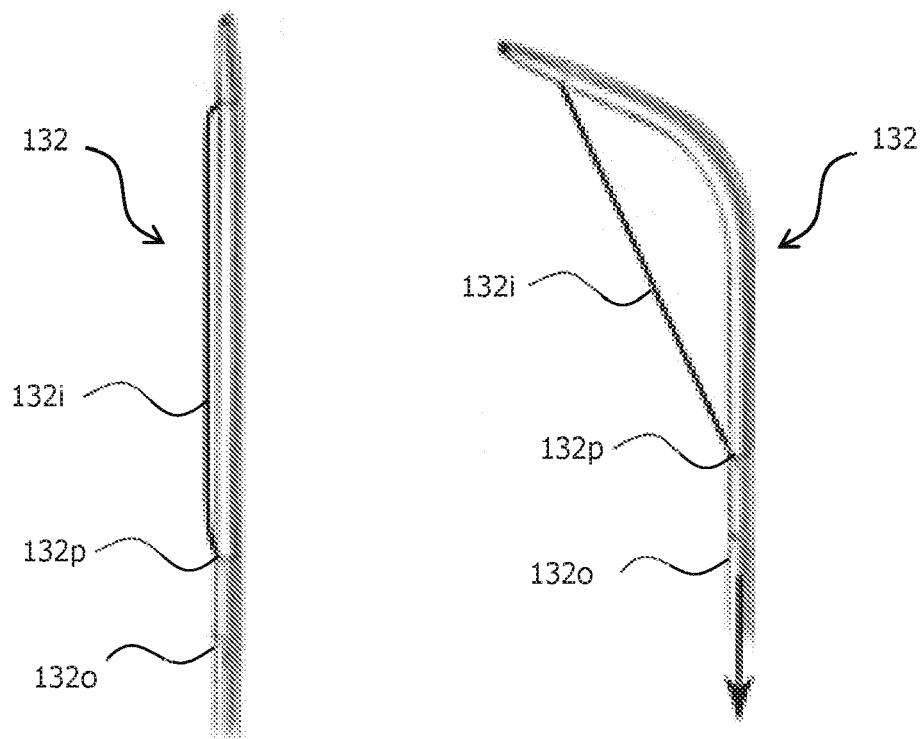


Fig. 5A

Fig. 5B

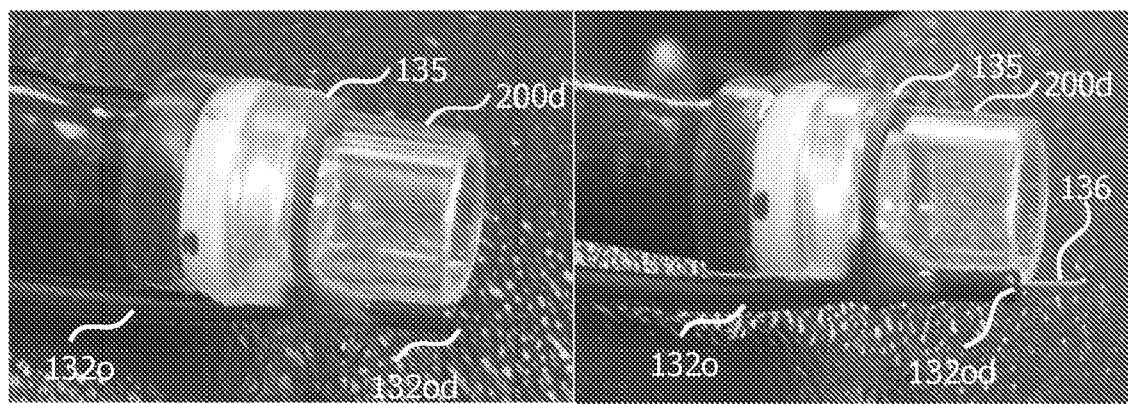


Fig. 6A

Fig. 6B



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